January 21, 1948.

Dear Jacques,

My last letter, on I think the 4 Nov., described a few sugar mutants that have been picked up here. I can't remember for sure whether I sent you any of them or not. Drop me a line and I'll send you any of the cultures I have and mention.

I am still anxious to receive your reprints, especially your book. I have started to do some adaptation experiments, and find that azide is a potent inhibitor of adaptation to lactose, maltose, etc. I am not clear from your papers however under what conditions adaptation may take place. In my experience, resting cell suspensions in aqueous lactose or maltose (plus phosphate buffer) will adapt over a period of several hours, in the absence of exogenous nitrogen. Do you have any comparable experiences? One of the most striking and inexplicable findings in this work has been the cross-reaction between trehalose and maltose. Trehalose-adapted cells are concomitantly maltose-adapted, but cells grown in maltose are not trehalose-adapted. This might suggest malto-zymase → trehalo-zymase, but none of the several maltose- mutants are trehalose negative. The work is hindered by the high cost of trehalose which has made large scale attempts to find trehalose-mutants unfeasible.

By selection in synthetic medium, only two "positive" mutants have been found: for salicin, and for amylose (a "saccharifying" amylase).

Probably the most interesting finding so far is that all the lactose-negative mutants are not by any means allelic. At least two loci have been definitely located, and there are probably others among a group not as yet analysed. The same holds for maltose; in addition there is a locus mutation at which leads not to maltose- but to a "slow" fermenter. I had in hand a third definitely located mutant which I thought to be lactose-, but it turns out to produce no acid even from glucose or galactose! Whether this mutant represents a block in the glycolytic mechanism, or is the sought-after general carbohydrase-precursor gene remains to be seen. I leave you to draw your own conclusions re 1:1 theory which can be inferred from the genetic data on lactose and maltose! Have you any suggestion regarding a two- or n-step mechanism for the dissimilation of lactose ?. B-methyl galactoside shows nearly the same reaction as lactose in these mutants, but butyl-b-galactoside is attacked by some mutants which are Lac-.

Write and tell me what you are doing with genetics of bacteria.

Sincerely,